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(57) **ABSTRACT**

- A chemical assay device includes a hydrophilic substrate and one or more hydrophobic structures that extend from a first side of the hydrophilic substrate to a second side of the hydrophilic substrate. A hydrophobic structure in the hydrophilic substrate forms a fluid barrier wall that extends from the first side of the hydrophilic substrate to the second side of the hydrophilic substrate with a deviation of less than 20° from a perpendicular axis between the first side and the second side. The hydrophobic structure is formed from a wax or a phase change ink.

- 8 Claims, 10 Drawing Sheets**

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